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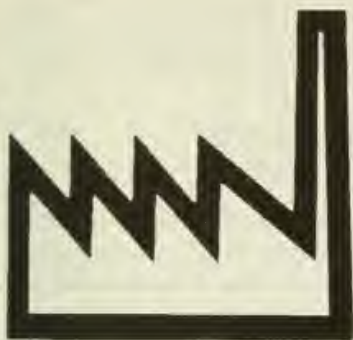
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PRELIMINARY REPORT
INDUSTRY SERIES

1987
Census of
Manufactures

MC87-I-38A(P)
Issued August 1989

**SEARCH AND NAVIGATION EQUIPMENT AND ENGINEERING, MEASURING,
CONTROLLING, AND OPTICAL INSTRUMENTS**

Industries 3812, 3821, 3822, 3823, 3824, 3825, 3826, 3827, and 3829

INTRODUCTION

This report presents preliminary statistics from the 1987 Census of Manufactures for those establishments classified in the industries listed above. These data will be superseded by a more comprehensive final paperbound report. The method of data collection and use of administrative data are discussed in detail in the appendix.

All dollar figures included in this report are at prices current for the year specified and, therefore, unadjusted for changes in price levels. Consequently, when making comparisons to prior years, users should take into consideration the inflation that has occurred.

The definitions of these industries are the same as those used in the 1987 Standard Industrial Classification (SIC) Manual.¹

**INDUSTRY 3812, SEARCH AND NAVIGATION
EQUIPMENT**

In the 1987 Census of Manufactures, Industry 3812, Search and Navigation Equipment, had employment of 372.0 thousand.

The total value of shipments for establishments classified in this industry was \$36.3 billion. The products primary to this industry appear in table 2 and aggregated to \$34.1 billion in 1987.

The cost of materials and services used by establishments in this industry amounted to \$12.2 billion in 1987. Data on specific materials consumed appear in table 3.

**INDUSTRY 3821, LABORATORY APPARATUS
AND FURNITURE**

In the 1987 Census of Manufactures, Industry 3821, Laboratory Apparatus and Furniture, had employment of 17.8 thousand.

The total value of shipments for establishments classified in this industry was \$1.8 billion. The products primary to this industry appear in table 2 and aggregated to \$1.6 billion in 1987.

The cost of materials and services used by establishments in this industry amounted to \$660.5 million in 1987. Data on specific materials consumed appear in table 3.

INDUSTRY 3822, ENVIRONMENTAL CONTROLS

In the 1987 Census of Manufactures, Industry 3822, Environmental Controls, had employment of 27.1 thousand. The employment figure was 6 percent below the 28.8 thousand reported in 1982.

The total value of shipments for establishments classified in this industry was \$2.2 billion. The products primary to this industry appear in table 2 and aggregated to \$2.1 billion in 1987.

The cost of materials and services used by establishments in this industry amounted to \$782.1 million in 1987. Data on specific materials consumed appear in table 3.

**INDUSTRY 3823, PROCESS CONTROL
INSTRUMENTS**

In the 1987 Census of Manufactures, Industry 3823, Process Control Instruments, had employment of 52.7 thousand. The employment figure was 13 percent below the 60.3 thousand reported in 1982.

¹Standard Industrial Classification Manual: 1987. For sale by Superintendent of Documents, U.S. Government Printing Office, Washington, DC 20402. Stock No. 041-001-00314-2.

Address inquiries to Bureau of the Census, Industry Division, Washington, DC 20233, or call Chad Nelson (301) 763-7304.



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The total value of shipments for establishments classified in this industry was \$4.8 billion. The products primary to this industry appear in table 2 and aggregated to \$4.4 billion in 1987.

The cost of materials and services used by establishments in this industry amounted to \$1.6 billion in 1987. Data on specific materials consumed appear in table 3.

INDUSTRY 3824, FLUID METERS AND COUNTING DEVICES

In the 1987 Census of Manufactures, Industry 3824, Fluid Meters and Counting Devices, had employment of 10.2 thousand. The employment figure was 9 percent below the 11.1 thousand reported in 1982.

The total value of shipments for establishments classified in this industry was \$960.3 million. The products primary to this industry appear in table 2 and aggregated to \$1.1 billion in 1987.

The cost of materials and services used by establishments in this industry amounted to \$395.9 million in 1987. Data on specific materials consumed appear in table 3.

INDUSTRY 3825, INSTRUMENTS TO MEASURE ELECTRICITY

In the 1987 Census of Manufactures, Industry 3825, Instruments to Measure Electricity, had employment of 85.1 thousand. The employment figure was 5 percent below the 89.7 thousand reported in 1982.

The total value of shipments for establishments classified in this industry was \$7.7 billion. The products primary to this industry appear in table 2 and aggregated to \$7.5 billion in 1987.

The cost of materials and services used by establishments in this industry amounted to \$2.7 billion in 1987. Data on specific materials consumed appear in table 3.

INDUSTRY 3826, ANALYTICAL INSTRUMENTS

In the 1987 Census of Manufactures, Industry 3826, Analytical Instruments, had employment of 33.8 thousand.

The total value of shipments for establishments classified in this industry was \$3.8 billion. The products primary to this industry appear in table 2 and aggregated to \$3.3 billion in 1987.

The cost of materials and services used by establishments in this industry amounted to \$1.3 billion in 1987. Data on specific materials consumed appear in table 3.

INDUSTRY 3827, OPTICAL INSTRUMENTS AND LENSES

In the 1987 Census of Manufactures, Industry 3827, Optical Instruments and Lenses, had employment of 21.6 thousand.

The total value of shipments for establishments classified in this industry was \$2.0 billion. The products primary to this industry appear in table 2 and aggregated to \$2.1 billion in 1987.

The cost of materials and services used by establishments in this industry amounted to \$768.6 million in 1987. Data on specific materials consumed appear in table 3.

INDUSTRY 3829, MEASURING AND CONTROLLING DEVICES, N.E.C.

In the 1987 Census of Manufactures, Industry 3829, Measuring and Controlling Devices, N.E.C., had employment of 38.2 thousand. The total value of shipments for establishments classified in this industry was \$3.1 billion. The products primary to this industry appear in table 2 and aggregated to \$3.5 billion in 1987.

The cost of materials and services used by establishments in this industry amounted to \$1.1 billion in 1987. Data on specific materials consumed appear in table 3.

ABBREVIATIONS AND SYMBOLS

The following abbreviations and symbols are used in the tables in this publication:

-	Represents zero.
(D)	Withheld to avoid disclosing data for individual companies; data are included in higher level totals.
(NA)	Not available.
(NC)	Not comparable.
(S)	Withheld because estimate did not meet publication standards on the basis of either the response rate or a consistency review.
(X)	Not applicable.
(Z)	Less than half the unit shown.
do	Ditto.
n.e.c.	Not elsewhere classified.
n.s.k.	Not specified by kind.
pt.	Part.
r	Revised.
SIC	Standard Industrial Classification.

Other abbreviations, such as lb, gal, yd, doz, bbl, and s tons, are used in the customary sense.

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Nondurables		
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Industry Analysis and Forecasts	International Trade Administration	(202) 377-4356

Table 1. Historical Statistics for the Industry: 1987 and Earlier Years

[Excludes data for auxiliaries. For meaning of abbreviations and symbols, see introductory text. For explanation of terms, see appendix.]

Year ¹	Companies ² (no.)	All establishments ³		All employees		Production workers			Value added by manufac- ture ⁴ (million dollars)	Cost of materials (million dollars)	Value of shipments (million dollars)	New capital expend- itures (million dollars)	End-of- year invent- ories ⁴ (million dollars)	Ratios	
		Total (no.)	With 20 employ- ees or more (no.)	Number (1,000)	Payroll (million dollars)	Number (1,000)	Hours (millions)	Wages (million dollars)						Spe- cial- ization (per- cent)	Cover- age (per- cent)
INDUSTRY 3812, SEARCH AND NAVIGATION EQUIPMENT ⁵															
1987 Census ----	(NA)	1 077	544	372.0	12 435.3	159.7	315.7	4 488.8	24 619.1	12 161.8	36 346.7	1 334.6	9 513.2	(NA)	(NA)
INDUSTRY 3821, LABORATORY APPARATUS AND FURNITURE ⁵															
1987 Census ----	(NA)	289	143	17.8	459.1	9.9	19.7	200.1	1 146.0	660.5	1 805.9	54.6	406.0	(NA)	(NA)
INDUSTRY 3822, ENVIRONMENTAL CONTROLS															
1987 Census ----	(NA)	258	112	27.1	617.0	18.9	36.7	362.3	1 403.7	782.1	2 194.8	67.9	386.5	(NA)	(NA)
1986 ASM -----	(NA)	(NA)	(NA)	25.8	575.6	18.5	35.7	350.3	1 278.2	687.3	1 990.4	49.8	335.4	(NA)	(NA)
1985 ASM -----	(NA)	(NA)	(NA)	27.1	580.9	19.5	36.9	355.9	1 318.2	669.8	1 989.3	63.6	366.5	(NA)	(NA)
1984 ASM -----	(NA)	(NA)	(NA)	28.2	574.2	20.9	38.5	359.0	1 303.6	684.2	1 966.1	57.9	377.0	(NA)	(NA)
1983 ASM -----	(NA)	(NA)	(NA)	27.9	539.5	20.4	38.1	332.1	1 130.5	616.6	1 745.2	67.7	363.6	(NA)	(NA)
1982 Census ----	221	245	89	28.8	497.5	20.6	36.2	301.9	1 025.7	514.3	1 549.1	66.8	361.7	92	90
1981 ASM -----	(NA)	(NA)	(NA)	32.6	527.8	23.9	45.5	337.6	991.1	588.4	1 587.1	72.6	348.3	(NA)	(NA)
1980 ASM -----	(NA)	(NA)	(NA)	33.2	502.3	24.8	48.9	338.1	969.5	592.2	1 541.5	60.6	344.7	(NA)	(NA)
1979 ASM -----	(NA)	(NA)	(NA)	35.1	474.8	26.8	52.3	325.0	872.2	511.5	1 366.2	46.3	312.8	(NA)	(NA)
1978 ASM -----	(NA)	(NA)	(NA)	40.0	487.1	31.4	61.5	345.0	951.5	568.7	1 492.5	49.4	308.5	(NA)	(NA)
1977 Census ----	182	201	91	39.0	450.3	30.6	57.9	315.6	859.6	529.4	1 358.7	47.7	285.9	80	92
1976 ASM -----	(NA)	(NA)	(NA)	31.5	336.6	23.3	44.1	217.3	737.2	376.8	1 071.7	21.6	227.0	(NA)	(NA)
1975 ASM -----	(NA)	(NA)	(NA)	26.6	274.2	18.3	34.5	164.7	526.9	275.0	827.2	11.6	183.9	(NA)	(NA)
1974 ASM -----	(NA)	(NA)	(NA)	33.3	303.8	24.3	45.0	193.4	594.3	338.2	916.8	26.2	209.5	(NA)	(NA)
1973 ASM -----	(NA)	(NA)	(NA)	33.0	288.1	25.5	48.4	191.4	606.8	281.3	857.8	18.0	176.2	(NA)	(NA)
1972 Census ----	117	131	62	30.7	253.6	23.3	44.5	166.4	511.8	223.8	728.1	17.1	141.3	86	90
INDUSTRY 3823, PROCESS CONTROL INSTRUMENTS															
1987 Census ----	(NA)	775	332	52.7	1 460.2	26.4	52.8	552.9	3 189.2	1 592.9	4 767.1	128.2	1 087.1	(NA)	(NA)
1986 ASM -----	(NA)	(NA)	(NA)	52.2	1 350.8	26.2	51.5	530.9	2 924.4	1 575.4	4 535.4	148.0	1 082.4	(NA)	(NA)
1985 ASM -----	(NA)	(NA)	(NA)	55.3	1 383.4	28.3	55.3	554.5	3 046.2	1 590.0	4 609.6	149.9	1 170.1	(NA)	(NA)
1984 ASM -----	(NA)	(NA)	(NA)	57.4	1 353.0	30.3	59.7	555.0	3 017.6	1 352.3	4 307.9	131.3	1 151.7	(NA)	(NA)
1983 ASM -----	(NA)	(NA)	(NA)	55.5	1 213.3	26.9	51.6	472.6	2 611.4	1 113.3	3 781.5	101.6	1 031.8	(NA)	(NA)
1982 Census ----	586	627	290	60.3	1 256.1	30.0	57.7	482.0	2 826.9	1 175.5	4 037.8	127.4	1 074.4	91	87
1981 ASM -----	(NA)	(NA)	(NA)	53.6	1 013.4	28.1	55.7	421.0	2 437.7	1 088.4	3 508.6	117.1	934.7	(NA)	(NA)
1980 ASM -----	(NA)	(NA)	(NA)	51.2	897.4	26.6	53.1	370.2	2 049.5	986.8	2 991.6	94.2	860.0	(NA)	(NA)
1979 ASM -----	(NA)	(NA)	(NA)	51.4	828.1	27.1	54.5	353.0	1 895.8	875.6	2 682.1	83.5	775.3	(NA)	(NA)
1978 ASM -----	(NA)	(NA)	(NA)	50.6	765.6	25.5	50.8	311.0	1 609.6	764.6	2 328.5	74.1	643.6	(NA)	(NA)
1977 Census ----	382	426	207	46.5	664.8	23.4	47.0	265.9	1 399.4	657.1	2 022.0	52.1	555.9	90	80
1976 ASM -----	(NA)	(NA)	(NA)	35.6	465.0	18.1	36.3	182.5	954.0	419.5	1 357.2	35.1	393.5	(NA)	(NA)
1975 ASM -----	(NA)	(NA)	(NA)	40.2	528.5	18.6	37.0	180.7	819.6	423.4	1 237.9	31.1	410.4	(NA)	(NA)
1974 ASM -----	(NA)	(NA)	(NA)	41.6	503.4	20.1	40.6	185.1	868.7	444.0	1 245.5	31.4	421.4	(NA)	(NA)
1973 ASM -----	(NA)	(NA)	(NA)	40.8	441.0	20.4	41.5	169.6	739.3	338.4	1 039.1	31.9	339.0	(NA)	(NA)
1972 Census ----	175	192	133	35.6	342.9	18.4	37.1	146.8	620.4	271.1	883.6	27.3	271.7	86	83
INDUSTRY 3824, FLUID METERS AND COUNTING DEVICES															
1987 Census ----	(NA)	157	60	10.2	237.5	6.5	12.7	119.8	573.6	395.9	960.3	34.9	177.6	(NA)	(NA)
1986 ASM ⁶ -----	(NA)	(NA)	(NA)	10.4	237.3	6.2	12.7	113.8	548.3	298.1	858.6	29.0	158.8	(NA)	(NA)
1985 ASM -----	(NA)	(NA)	(NA)	10.4	236.6	6.2	11.8	117.4	554.7	310.2	865.3	41.0	171.6	(NA)	(NA)
1984 ASM -----	(NA)	(NA)	(NA)	10.9	230.9	6.5	12.2	119.5	529.5	298.2	810.9	26.3	184.5	(NA)	(NA)
1983 ASM -----	(NA)	(NA)	(NA)	9.8	189.7	6.2	11.8	103.9	422.9	259.3	692.4	18.0	154.6	(NA)	(NA)
1982 Census ----	133	145	70	11.1	198.0	6.9	13.1	109.4	460.2	266.7	728.3	27.6	172.0	94	84
1981 ASM -----	(NA)	(NA)	(NA)	15.2	256.8	10.3	20.2	153.7	530.0	368.0	901.1	32.2	182.8	(NA)	(NA)
1980 ASM -----	(NA)	(NA)	(NA)	16.5	247.9	11.3	22.2	152.7	533.6	358.6	884.0	27.8	192.4	(NA)	(NA)
1979 ASM -----	(NA)	(NA)	(NA)	17.8	245.5	11.9	23.6	143.2	556.7	315.0	844.2	28.6	203.1	(NA)	(NA)
1978 ASM -----	(NA)	(NA)	(NA)	17.0	221.6	11.8	23.4	138.4	489.4	273.9	749.9	18.0	172.0	(NA)	(NA)
1977 Census ----	100	111	62	15.9	197.6	11.2	22.5	118.0	429.0	231.3	650.4	19.9	148.8	80	80
1976 ASM -----	(NA)	(NA)	(NA)	13.8	161.5	9.5	18.3	93.5	352.1	187.3	531.7	12.8	129.4	(NA)	(NA)
1975 ASM -----	(NA)	(NA)	(NA)	13.4	143.9	9.2	17.9	82.4	297.0	162.9	475.0	12.7	119.9	(NA)	(NA)
1974 ASM -----	(NA)	(NA)	(NA)	13.2	126.0	9.4	18.8	75.0	272.4	168.3	431.5	13.2	110.7	(NA)	(NA)
1973 ASM -----	(NA)	(NA)	(NA)	9.7	85.3	6.6	13.5	49.5	196.6	129.1	322.7	9.6	83.7	(NA)	(NA)
1972 Census ----	51	61	43	8.8	76.8	5.9	11.7	43.1	180.9	108.1	296.2	7.0	65.2	90	79
INDUSTRY 3825, INSTRUMENTS TO MEASURE ELECTRICITY															
1987 Census ----	(NA)	913	401	85.1	2 466.9	44.2	91.9	1 020.0	5 015.6	2 709.6	7 702.9	297.5	1 867.1	(NA)	(NA)
1986 ASM -----	(NA)	(NA)	(NA)	86.2	2 356.1	44.3	89.2	986.0	4 535.2	2 407.1	6 940.5	290.4	1 739.4	(NA)	(NA)
1985 ASM -----	(NA)	(NA)	(NA)	92.4	2 293.6	48.3	93.1	989.6	5 169.8	2 474.0	7 705.2	343.1	1 811.8	(NA)	(NA)
1984 ASM -----	(NA)	(NA)	(NA)	95.8	2 356.1	53.0	101.7	987.2	5 371.3	2 589.5	7 810.5	418.0	1 890.7	(NA)	(NA)
1983 ASM -----	(NA)	(NA)	(NA)	89.7	2 052.3	49.5	94.1	860.4	4 413.3	2 129.0	6 484.4	272.6	1 586.5	(NA)	(NA)
1982 Census ----	676	749	352	89.7	1 888.2	48.9	92.5	757.1	4 290.1	1 840.7	6 094.4	308.3	1 469.1	94	91
1981 ASM -----	(NA)	(NA)	(NA)	94.8	1 852.9	50.2	96.7	736.4	4 074.6	1 780.9	5 744.9	278.6	1 344.7	(NA)	(NA)
1980 ASM -----	(NA)	(NA)	(NA)	94.9	1 647.9	52.4	100.7	667.4	3 574.1	1 697.9	5 183.4	260.4	1 229.9	(NA)	(NA)
1979 ASM -----	(NA)	(NA)	(NA)	84.6	1 258.9	48.4	96.5	557.1	2 796.0	1 340.4	4 025.0	215.7	1 049.3	(NA)	(NA)
1978 ASM -----	(NA)	(NA)	(NA)	76.6	1 072.3	45.6	88.6	503.6	2 162.1	1 286.2	3 368.6	150.0	834.4	(NA)	(NA)
1977 Census ----	621	671	279	66.5	889.1	40.4	78.3	414.5	1 807.7	1 026.8	2 761.0	99.1	668.9	90	89
1976 ASM -----	(NA)	(NA)	(NA)	61.1	759.2	37.7	72.3	359.3	1 507.1	842.8	2 365.5	71.1	547.7	(NA)	(NA)
1975 ASM -----	(NA)	(NA)	(NA)	60.9	700.8	37.7	70.5	328.5	1 452.9	714.1	2 198.9	69.8	523.5	(NA)	(NA)
1974 ASM -----	(NA)	(NA)	(NA)	67.9	689.3	43.6	84.5	338.1	1 390.2	713.3	2 073.8	75.5	550.0	(NA)	(NA)
1973 ASM -----	(NA)	(NA)	(NA)	60.2	563.8	38.9	77.2	289.4	1 191.8	585.0	1 735.6	60.4	460.5	(NA)	(NA)
1972 Census ----	606	632	252	54.7	523.5	34.6	68.7	257.9	1 046.8	524.9	1 540.8	39.3	382.2	80	88
INDUSTRY 3826, ANALYTICAL INSTRUMENTS ⁵															
1987 Census ----	(NA)	559	209	33.8	975.5	14.5	28.5	309.5	2 313.5	1 339.0	3 809.7	137.9	861.6	(NA)	(NA)

See footnotes at end of table.

Table 1. Historical Statistics for the Industry: 1987 and Earlier Years—Con.

[Excludes data for auxiliaries. For meaning of abbreviations and symbols, see introductory text. For explanation of terms, see appendix]

Year ¹	Companies ² (no.)	All establishments ³		All employees		Production workers			Value added by manufacture ⁴ (million dollars)	Cost of materials (million dollars)	Value of shipments (million dollars)	New capital expend- itures (million dollars)	End-of- year inventories ⁴ (million dollars)	Ratios	
		Total (no.)	With 20 employ- ees or more (no.)	Number (1,000)	Payroll (million dollars)	Number (1,000)	Hours (millions)	Wages (million dollars)						Spe- cial- ization (per- cent)	Cover- age (per- cent)
INDUSTRY 3827, OPTICAL INSTRUMENTS AND LENSES ⁵															
1987 Census ----	(NA)	249	125	21.6	626.9	11.7	22.1	262.4	1 295.3	768.6	2 017.5	89.9	645.3	(NA)	(NA)
INDUSTRY 3829, MEASURING AND CONTROLLING DEVICES, N.E.C. ⁵															
1987 Census ----	(NA)	887	323	38.2	1 009.1	18.7	36.6	374.4	2 079.9	1 078.9	3 119.2	97.7	809.7	(NA)	(NA)

Note: Establishments of single unit companies with up to 20 employees (cutoff varied by industry) were excluded from the mail portion of the census. Data for these establishments (and a small number of larger establishments whose reports were not received at the time the data were tabulated) were estimated based on administrative-record information from other agencies in conjunction with industry averages. These establishments accounted for the following percent of total value of shipments: SIC 3812, 5%; SIC 3821, 5%; SIC 3822, 6%; SIC 3823, 10%; SIC 3824, 6%; SIC 3825, 12%; SIC 3826, 10%; SIC 3827, 5%; and SIC 3829, 13%.

¹In annual survey of manufactures (ASM) years, data are estimates based on a representative sample of establishments canvassed annually and may differ from results of a complete canvass of all establishments. ASM publication shows percentage standard errors. Unless otherwise noted, for data prior to 1972, see 1972 Census of Manufactures, vol. II, table 1a of the industry chapter.

²For the census, a company is defined as a business organization consisting of one establishment or more under common ownership or control.

³Includes establishments with payroll at any time during year.

⁴Beginning with the 1982 Census of Manufactures, all respondents were requested to report their inventories at (the lower of) cost or market prior to adjustment to LIFO cost. This is a change from prior Censuses and annual surveys of manufactures in which respondents were permitted to value their inventories using any generally accepted accounting method. Consequently, inventories and value added by manufacture are not comparable to prior-year data.

⁵Industry definition is new for 1987 Census of Manufactures. An explanation of the Standard Industrial Classification revision will appear in the final industry series text that supercedes this report.

⁶Data either have associated standard errors exceeding 15 percent or are not consistent with other census series and related data; thus these estimates may be of limited reliability.

Table 2. Product and Product Classes—Value of Shipments by All Producers: 1987 and 1982

[Includes value of products of this industry produced by (1) establishments classified in this industry (primary) and (2) establishments classified in other industries (secondary). Transfers of products of this industry from one establishment of the same company (interplant transfers) are also included. For further explanation, see Value of Shipments in appendix. For meaning of abbreviations and symbols, see introductory text.]

1987 product code	Product	1987		1982	
		Number of companies with shipments of \$100,000 or more	Value of product shipments ¹ (million dollars)	Number of companies with shipments of \$100,000 or more	Value of product shipments ¹ (million dollars)
3812--	SEARCH, DETECTION, NAVIGATION, GUIDANCE, AERONAUTICAL AND NAUTICAL SYSTEMS, INSTRUMENTS, AND EQUIPMENT				
	Total	(NA)	² 34 101.8	(NA)	(²)
38121 --	Aeronautical, nautical, and navigational instruments, not sending or receiving radio signals (excluding engine instruments):				
38121 00	Aeronautical, nautical, and navigational instruments, not sending or receiving radio signals, (excluding engine instruments) (for additional detail, see Current Industrial Report MA-38B, Selected Instruments and Related Products)	114	2 131.8	124	³ 1 418.7
38122 --	Search, detection, navigation, and guidance systems and equipment:				
38122 00	Search, detection, navigation, and guidance systems and equipment (for additional detail, see Current Industrial Report MA-36P, Communication Equipment, Including Telephone and Telegraph Equipment)	221	30 642.8	(NA)	(⁴)
38120 --	Search, detection, navigation, guidance, aeronautical, and nautical systems, instruments, and equipment, n.s.k.	(NA)	⁵ 1 327.1	(NA)	(²)
38120 00	Search, detection, navigation, guidance, aeronautical and nautical systems, instruments, and equipment, n.s.k., typically for establishments with 10 employees or more (see note)	(NA)	⁵ 1 186.3	(NA)	(²)
38120 02	Search, detection, navigation, guidance, aeronautical and nautical systems, instruments, and equipment, n.s.k., typically for establishments with less than 10 employees (see note)	(NA)	⁵ 140.8	(NA)	(²)
3821--	LABORATORY APPARATUS AND FURNITURE				
	Total	(NA)	1 635.4	(NA)	(⁶)
38210 --	Laboratory apparatus and furniture	(NA)	1 635.4	(NA)	(⁶)
38210 10	Laboratory apparatus (for additional detail, see Current Industrial Report MA-38B, Selected Instruments and Related Products)	224	1 386.4	239	⁷ 1 083.6
38210 20	Laboratory furniture and parts sold separately (for additional detail, see Current Industrial Report MA-38B, Selected Instruments and Related Products)	24	205.1	(NA)	(⁸)
38210 00	Laboratory apparatus and furniture, n.s.k., typically for establishments with 10 employees or more (see note)	(NA)	12.0	(NA)	(⁶)
38210 02	Laboratory apparatus and furniture, n.s.k., typically for establishments with less than 10 employees (see note)	(NA)	31.9	(NA)	(⁶)

See footnotes at end of table.

Table 2. Product and Product Classes—Value of Shipments by All Producers: 1987 and 1982
—Con.

[Includes value of products of this industry produced by (1) establishments classified in this industry (primary) and (2) establishments classified in other industries (secondary). Transfers of products of this industry from one establishment of the same company (interplant transfers) are also included. For further explanation, see Value of Shipments in appendix. For meaning of abbreviations and symbols, see introductory text.]

1987 product code	Product	1987		1982	
		Number of companies with shipments of \$100,000 or more	Value of product shipments ¹ (million dollars)	Number of companies with shipments of \$100,000 or more	Value of product shipments ¹ (million dollars)
3822- --	ENVIRONMENTAL CONTROLS				
	Total	(NA)	2 136.4	(NA)	1 544.5
38220 --	Automatic controls for regulating residential and commercial environments and appliances:				
38220 00	Automatic controls for regulating residential and commercial environments and appliances used as components of air-conditioning, refrigeration, and comfort heating (including pneumatic controls) (for additional detail, see Current Industrial Report MA-38B, Selected Instruments and Related Products)	130	2 071.5	153	1 512.3
38220 02	Automatic controls for regulating residential and commercial environments and appliances, n.s.k., typically for establishments with less than 20 employees (see note)	(NA)	64.9	(NA)	32.2
3823- --	PROCESS CONTROL INSTRUMENTS				
	Total	(NA)	4 357.0	(NA)	3 915.1
38230 --	Process control instruments:				
38230 00	Process control instruments (for additional detail, see Current Industrial Report MA-38B, Selected Instruments and Related Products)	447	4 170.9	589	3 814.2
38230 02	Process control instruments, n.s.k., typically for establishments with less than 20 employees (see note)	(NA)	186.1	(NA)	100.9
3824- --	FLUID METERS AND COUNTING DEVICES				
	Total	(NA)	1 134.5	(NA)	787.1
38242 --	Integrating and totalizing meters for gas and liquids:				
38242 00	Integrating and totalizing meters for gas and liquids (for additional detail, see Current Industrial Report MA-38B, Selected Instruments and Related Products)	48	608.9	60	519.6
38243 --	Counting devices:				
38243 00	Counting devices, excluding motor vehicle instruments (for additional detail, see Current Industrial Report MA-38B, Selected Instruments and Related Products)	47	218.8	42	162.0
38244 --	Motor vehicle instruments:				
38244 00	Motor vehicle instruments (for additional detail, see Current Industrial Report MA-38B, Selected Instruments and Related Products)	24	241.0	(NA)	76.2
38240 --	Fluid meters and counting devices, n.s.k.	(NA)	65.9	(NA)	29.3
38240 00	Fluid meters and counting devices, n.s.k., typically for establishments with 20 employees or more (see note)	(NA)	32.7	(NA)	11.8
38240 02	Fluid meters and counting devices, n.s.k., typically for establishments with less than 20 employees (see note)	(NA)	33.2	(NA)	17.5
3825- --	INSTRUMENTS TO MEASURE ELECTRICITY				
	Total	(NA)	7 473.1	(NA)	5 575.6
38251 --	Integrating instruments, electrical:				
38251 00	Integrating instruments, electrical (for additional detail, see Current Industrial Report MA-38B, Selected Instruments and Related Products) ..	22	397.7	30	363.2
38252 --	Test equipment for testing electrical, radio and communication circuits, and motors:				
38252 00	Test equipment for testing electrical, radio, and communication circuits, and motors (for additional detail, see Current Industrial Report MA-38B, Selected Instruments and Related Products)	338	5 722.6	312	4 455.2
38253 --	Instruments to measure electricity, n.e.c.:				
38253 00	Instruments to measure electricity, n.e.c. (for additional detail, see Current Industrial Report MA-38B, Selected Instruments and Related Products) ..	90	659.9	126	556.7
38250 --	Instruments to measure electricity, n.s.k.	(NA)	692.9	(NA)	200.5
38250 00	Instruments to measure electricity, n.s.k., typically for establishments with 10 employees or more (see note)	(NA)	434.9	(NA)	102.1
38250 02	Instruments to measure electricity, n.s.k., typically for establishments with less than 10 employees (see note)	(NA)	258.0	(NA)	98.4
3826- --	ANALYTICAL INSTRUMENTS				
	Total	(NA)	⁹ 3 252.3	(NA)	(⁹)
38260 --	Analytical and scientific instruments, except optical:				
38260 00	Analytical and scientific instruments, except optical (for additional detail, see Current Industrial Report MA-38B, Selected Instruments and Related Products)	265	¹⁰ 3 144.6	(NA)	(⁹)
38260 02	Analytical and scientific instruments, except optical, n.s.k., typically for establishments with less than 5 employees (see note)	(NA)	¹⁰ 107.7	(NA)	(⁹)

See footnotes at end of table.

Table 2. Product and Product Classes—Value of Shipments by All Producers: 1987 and 1982

— Con.

[Includes value of products of this industry produced by (1) establishments classified in this industry (primary) and (2) establishments classified in other industries (secondary). Transfers of products of this industry from one establishment of the same company (interplant transfers) are also included. For further explanation, see Value of Shipments in appendix. For meaning of abbreviations and symbols, see introductory text.]

1987 product code	Product	1987		1982	
		Number of companies with shipments of \$100,000 or more	Value of product shipments ¹ (million dollars)	Number of companies with shipments of \$100,000 or more	Value of product shipments ¹ (million dollars)
3827- --	OPTICAL INSTRUMENTS AND LENSES				
	Total	(NA)	¹ 2 106.9	(NA)	(¹¹)
38271 -- 38271 00	Sighting, tracking, and fire control equipment, optical type: Sighting, tracking, and fire control equipment, optical type (for additional detail, see Current Industrial Report MA-38B, Selected Instruments and Related Products)	53	721.1	53	¹² 505.4
38272 -- 38272 00	Binoculars and astronomical instruments: Binoculars and astronomical instruments (for additional detail, see Current Industrial Report MA-38B, Selected Instruments and Related Products) ..	14	32.0	170	¹³ 922.8
38273 -- 38273 00	Optical instruments and lenses, n.e.c.: Optical instruments and lenses, n.e.c. (for additional detail, see Current Industrial Report MA-38B, Selected Instruments and Related Products) ..	150	1 160.8		
38270 -- 38270 00	Optical instruments and lenses, n.s.k. Optical instruments and lenses, n.s.k., typically for establishments with 10 employees or more (see note)	(NA)	192.9	(NA)	(¹¹)
38270 02	Optical instruments and lenses, n.s.k., typically for establishments with less than 10 employees (see note)	(NA)	138.0	(NA)	(¹¹)
		(NA)	54.9		
3829- --	MEASURING AND CONTROLLING DEVICES, N.E.C.				
	Total	(NA)	¹⁴ 3 547.8	(NA)	(¹⁴)
38291 -- 38291 00	Aircraft engine instruments, except flight: Aircraft engine instruments, except flight (for additional detail, see Current Industrial Report MA-38B, Selected Instruments and Related Products) ..	41	502.9	42	311.0
38292 -- 38292 00	Physical properties and kinematic testing and inspection equipment: Physical properties and kinematic testing and inspection equipment (for additional detail, see Current Industrial Report MA-38B, Selected Instruments and Related Products)	171	878.8	199	635.2
38294 -- 38294 00	Nuclear radiation detection and monitoring instruments: Nuclear radiation detection and monitoring instruments (for additional detail, see Current Industrial Report MA-38B, Selected Instruments and Related Products)	52	613.3	71	596.4
38295 --	Commercial, geophysical, meteorological, and general-purpose instruments and equipment	(NA)	876.1	(NA)	(NA)
38295 10	Commercial, geophysical, meteorological, and general-purpose instruments (for additional detail, see Current Industrial Report MA-38B, Selected Instruments and Related Products)	117	366.5	146	¹⁵ 365.2
38295 20	Meteorological and geophysical electronic equipment (for additional detail, see Current Industrial Report MA-36P, Communication Equipment, Including Telephone and Telegraph Equipment)	52	509.5	(NA)	(¹⁶)
38295 00	Commercial, geophysical, meteorological, and general-purpose instruments and equipment, n.s.k.	-	-	(NA)	(NA)
38296 -- 38296 00	Surveying and drafting instruments and associated equipment: Surveying and drafting instruments and apparatus, including photogrammetric equipment (for additional detail, see Current Industrial Report MA-38B, Selected Instruments and Related Products)	40	237.3	(NA)	(¹⁷)
38290 -- 38290 00	Measuring and controlling devices, n.e.c., n.s.k. Measuring and controlling devices, n.e.c., n.s.k., typically for establishments with 5 employees or more (see note)	(NA)	439.5	(NA)	(¹⁴)
38290 02	Measuring and controlling devices, n.e.c., n.s.k., typically for establishments with less than 5 employees (see note)	(NA)	301.4	(NA)	(¹⁴)
		(NA)	138.1	(NA)	(¹⁴)

Note: In 1987 Census of Manufactures, data for establishments of small single unit companies with up to 20 employees were estimated from administrative-record data rather than data actually collected from respondents. Employment cutoffs used for administrative records for each industry and shipments figures are included in code ending with "002". In both 1987 and 1982 Censuses of Manufactures, products not completely identified on standard forms were coded in appropriate product class (five-digit) followed by "00" or to appropriate product group code (four-digit) followed by "000".

- ¹Data reported by all producers, not just those with shipments of \$100,000 or more.
- ²SIC Industry 3812, Search and Navigation Equipment is published as a separate industry for the first time in 1987. In 1982, data were included as part of old SIC Industries 3811, Engineering and Scientific Instruments, and 3662, Radio and Television Communication Equipment, and separate data are not available.
- ³In 1982, data for product code 38121 00 were published as old product code 38111 00.
- ⁴In 1982, data for product code 38122 00 were published as part of old product code 36625 00 and 36629 00.
- ⁵Data include an undeterminable amount of laboratory apparatus and furniture (SIC 3821) and measuring and controlling devices, n.e.c., (SIC 3829) manufacturers that did not totally identify their products.
- ⁶SIC Industry 3821, Laboratory Apparatus and Furniture is published as a separate industry for the first time in 1987. In 1982, data were included as part of old SIC Industry 3811, Engineering and Scientific Instruments and separate data are not available.
- ⁷In 1982, data for product code 38210 10 were published as old product code 38112 00.
- ⁸In 1982, data for product code 38210 20 were published as part of old product code 38113 00 and separate data are not available.
- ⁹SIC Industry 3826, Analytical Instruments is published as a separate industry for the first time in 1987. In 1982, data were included as part of old SIC Industry 3832, Optical Instruments and Lenses and separate data are not available.
- ¹⁰Data include an undeterminable amount of optical instruments and lenses (SIC 3827) manufacturers that did not totally identify their products.
- ¹¹SIC Industry 3827, Optical Instruments and Lenses, is published as a separate industry for the first time in 1987. In 1982, data were included as part of old SIC Industry 3832, Optical Instruments and Lenses and separate data are not available.
- ¹²In 1982, data for product code 38271 00 were published as old product code 38324 00.
- ¹³In 1982, data for product codes 38272 00 and 38273 00 were published as old product code 38325 00 and separate data are not available.
- ¹⁴SIC Industry 3829, Measuring and Controlling Devices, N.E.C., was redefined for 1987. In 1982, data were included as part of old SIC Industries 3829, Measuring and Controlling Devices, N.E.C.; 3662, Radio and Television Communication Equipment; and 3811, Engineering and Scientific Instruments, and separate data are not available.
- ¹⁵In 1982, data for product code 38295 10 were published as old product code 38293 00.
- ¹⁶In 1982, data for product code 38295 20 were published as part of old product code 36625 00 and separate data are not available.
- ¹⁷In 1982, data for product code 38296 00 were published as part of old product code 38113 00 and separate data are not available.

Table 3. Materials Consumed by Kind: 1987 and 1982

[Includes quantity and cost of materials consumed or put into production by establishments classified only in this industry. For further explanation, see Cost of Materials in appendix. For meaning of abbreviations and symbols, see introductory text]

1987 material code	Material	1987		1982	
		Quantity ¹	Delivered cost (million dollars)	Quantity ¹	Delivered cost (million dollars)
	INDUSTRY 3812, SEARCH AND NAVIGATION EQUIPMENT				
	Materials, parts, containers, and supplies	(X)	³ 10 483.2	(X)	(²)
	Mill shapes and forms, except castings and forgings:				
331001	Carbon steel	(S)	94.3	(NA)	(NA)
331020	Alloy steel (except stainless)	**9.1	92.1	(NA)	(NA)
331031	Stainless steel	(S)	8.0	(NA)	(NA)
	Copper and copper-base alloy:				
335728	Bare wire (for electrical conduction only)	(S)	5.3	(NA)	(NA)
335102	Rod, bar, and mechanical wire, including extruded and/or drawn shapes	(S)	1.0	(NA)	(NA)
335143	Plate, sheet, and strip, including military cups and discs	(S)	1.5	(NA)	(NA)
335152	Pipe and tube	(S)	1.2	(NA)	(NA)
	Aluminum and aluminum-base alloy:				
335301	Sheet, plate, and foil	(S)	13.0	(NA)	(NA)
335405	Extruded shapes, including extruded rod, bar, pipe, tube, etc.	(S)	7.7	(NA)	(NA)
335008	All other aluminum mill shapes and forms (wire, rolled rod and bar, powder, welded tubing, etc.)	*17.3	44.6	(NA)	(NA)
	Castings (rough and semifinished):				
332012	Iron (gray and malleable)	(S)	54.2	(NA)	(NA)
336005	Aluminum and aluminum-base alloy	(S)	71.9	(NA)	(NA)
336003	Other nonferrous	(S)	10.0	(NA)	(NA)
367004	Resistors, capacitors, transformers, electron tubes, semiconductors, and other electronic-type components	(X)	1 566.8	(NA)	(NA)
265001	Paperboard containers, boxes, and corrugated paperboard	(X)	15.8	(NA)	(NA)
320101	Glass and glass products, excluding windows and mirrors	(X)	38.3	(NA)	(NA)
	Bearings, including mounted and unmounted:				
356218	Ball	(X)	10.5	(NA)	(NA)
356201	Roller	(X)	2.4	(NA)	(NA)
364300	Current-carrying wiring devices	(X)	59.4	(NA)	(NA)
382501	Electrical instrument mechanisms and meter movements, including instrument relays	(X)	209.0	(NA)	(NA)
282104	Plastics resins consumed in the form of granules, pellets, powders, liquids, etc., excluding sheets, rods, tubes, and shapes	(S)	16.1	(NA)	(NA)
344401	Sheet metal products, except stampings	(X)	95.1	(NA)	(NA)
345001	Bolts, nuts, screws, washers, rivets, and screw machine products	(X)	69.6	(NA)	(NA)
346901	Metal stampings	(X)	26.1	(NA)	(NA)
308006	Fabricated plastics products, except gaskets, hose, and belting	(X)	35.1	(NA)	(NA)
357004	Electronic computing equipment and parts	(X)	417.1	(NA)	(NA)
970099	All other materials and components, parts, containers, and supplies	(X)	5 270.4	(NA)	(NA)
971000	Materials, parts, containers, and supplies, n.s.k. ²	(X)	2 246.7	(NA)	(NA)
	INDUSTRY 3821, LABORATORY APPARATUS AND FURNITURE				
	Materials, parts, containers, and supplies	(X)	³ 541.2	(X)	(²)
	Mill shapes and forms, except castings and forgings:				
	Carbon steel:				
331011	Bars and bar shapes	(S)	3.6	(NA)	(NA)
331012	Sheet and strip	(S)	16.6	(NA)	(NA)
331013	Plates	(D)	(⁴)	(NA)	(NA)
331015	Structural shapes	(S)	1.7	(NA)	(NA)
331017	Wire and wire products	(D)	(⁴)	(NA)	(NA)
331019	All other carbon steel mill shapes and forms	(S)	44.7	(NA)	(NA)
	Alloy steel, except stainless:				
331021	Bars and bar shapes	(S)	2.5	(NA)	(NA)
331029	All other alloy steel mill shapes and forms	(D)	(⁵)	(NA)	(NA)
	Stainless steel:				
331033	Sheet and strip	(S)	11.1	(NA)	(NA)
331050	All other stainless steel mill shapes and forms	36.0	5.6	(NA)	(NA)
	Copper and copper-base alloy:				
335728	Bare wire (for electrical conduction only)	(S)	3.0	(NA)	(NA)
335102	Rod, bar, and mechanical wire, including extruded and/ or drawn shapes	(S)	1.0	(NA)	(NA)
335143	Plate, sheet, and strip, including military cups and discs	(S)	.1	(NA)	(NA)
335152	Pipe and tube	(S)	2.3	(NA)	(NA)
	Aluminum and aluminum-base alloy:				
335301	Sheet, plate, and foil	(S)	1.3	(NA)	(NA)
335405	Extruded shapes, including extruded rod, bar, pipe, tube, etc.	(S)	1.3	(NA)	(NA)
335008	All other aluminum mill shapes and forms (wire, rolled rod and bar, powder, welded tubing, etc.)	(S)	1.2	(NA)	(NA)
335792	Insulated copper wire and cable, except magnet wire (quantity of copper content)	(S)	(Z)	(NA)	(NA)
	Castings (rough and semifinished):				
332011	Iron (gray and malleable)	(S)	.2	(NA)	(NA)
332045	Steel	(D)	(⁵)	(NA)	(NA)
336005	Aluminum and aluminum-base alloy	(S)	2.0	(NA)	(NA)
336006	Copper and copper-base alloy	(S)	.1	(NA)	(NA)
336008	Other nonferrous	(S)	.5	(NA)	(NA)
	Fractional horsepower electric motors and generators (less than 1 hp):				
362110	Timing motors, synchronous and subsynchronous	(S)	1.0	(NA)	(NA)
362115	Other fractional horsepower electric motors, and generators (excluding timing motors)	(S)	4.7	(NA)	(NA)

See footnotes at end of table.

Table 3. Materials Consumed by Kind: 1987 and 1982—Con.

[Includes quantity and cost of materials consumed or put into production by establishments classified only in this industry. For further explanation, see Cost of Materials in appendix. For meaning of abbreviations and symbols, see introductory text]

1987 material code	Material	1987		1982	
		Quantity ¹	Delivered cost (million dollars)	Quantity ¹	Delivered cost (million dollars)
	INDUSTRY 3821, LABORATORY APPARATUS AND FURNITURE—Con.				
	Bearings, including mounted and unmounted:				
356218	Ball	(X)	2.1	(NA)	(NA)
356201	Roller	(X)	.1	(NA)	(NA)
367004	Resistors, capacitors, transformers, electron tubes, semiconductors, and other electronic-type components	(X)	23.5	(NA)	(NA)
344401	Sheet metal products, except stampings	(X)	12.4	(NA)	(NA)
345001	Bolts, nuts, screws, washers, rivets, and screw machine products	(X)	4.5	(NA)	(NA)
364300	Current-carrying wiring devices	(X)	2.3	(NA)	(NA)
282104	Plastics resins consumed in the form of granules, pellets, powders, liquids, etc., excluding sheets, rods, tubes, and shapes	(S)	5.8	(NA)	(NA)
349012	Fabricated wire products	(X)	1.0	(NA)	(NA)
308006	Fabricated plastics products, except gaskets	(X)	4.5	(NA)	(NA)
320101	Glass and glass products, excluding windows and mirrors	(X)	3.7	(NA)	(NA)
346901	Metal stampings	(X)	1.5	(NA)	(NA)
382501	Electrical instrument mechanisms and meter movements, including instrument relays	(X)	5.7	(NA)	(NA)
382591	Electrical measuring instruments and parts, n.e.c.	(X)	4.4	(NA)	(NA)
360101	Electric transmission, distribution, and control equipment	(X)	3.1	(NA)	(NA)
357001	Electronic computing equipment and parts	(X)	7.9	(NA)	(NA)
260003	Paper and paperboard products (except paperboard boxes, containers, and corrugated paperboard)	(S)	3.4	(NA)	(NA)
265001	Paperboard containers, boxes, and corrugated paperboard	(S)	6.3	(NA)	(NA)
970099	All other materials and components, parts, containers, and supplies	(X)	⁵ 241.7	(NA)	(NA)
971000	Materials, parts, containers, and supplies, n.s.k. ²	(X)	143.8	(NA)	(NA)
	INDUSTRY 3822, ENVIRONMENTAL CONTROLS				
	Materials, parts, containers, and supplies	(X)	682.3	(X)	463.9
	Mill shapes and forms, except castings and forgings:				
	Carbon steel:				
331011	Bars and bar shapes	(S)	.7	(S)	4.7
331012	Sheet and strip	(S)	11.3	*14.3	7.5
331013	Plates				
331015	Structural shapes				
331017	Wire and wire products	(S)	3.7	(S)	11.8
331019	All other carbon steel mill shapes and forms				
	Alloy steel, except stainless:				
331021	Bars and bar shapes	(S)	.1		
331029	All other alloy steel mill shapes and forms	(S)	3.6	(S)	3.0
	Stainless steel:				
331033	Sheet and strip	(S)	6.0	(S)	3.5
331050	All other stainless steel mill shapes and forms	(S)	4.1	(S)	5.4
	Copper and copper-base alloy:				
335728	Bare wire for electrical conduction only	(S)	2.5	1.3	2.1
335102	Rod, bar, and mechanical wire, including extruded and/ or drawn shapes	19.7	10.3	**7.0	6.7
335143	Plate, sheet, and strip, including military cups and discs	(S)	5.7	(S)	3.3
335152	Pipe and tube	2.5	4.2	**2.9	4.8
	Aluminum and aluminum-base alloy:				
335301	Sheet, plate, and foil	(S)	6.3		
335405	Extruded shapes, including extruded rod, bar, pipe, tube, etc.	4.4	2.5	*5.4	5.6
335008	All other aluminum and aluminum-alloy mill shapes and forms (wire, rolled rod and bar, powder, welded tubing, etc.)	(S)	3.5	.6	.6
335792	Insulated copper wire and cable, except magnet wire (quantity of copper content)	(S)	1.2	**3.6	4.5
	Castings (rough and semifinished):				
332011	Iron (gray and malleable)	(D)	(⁵)	(D)	(⁶)
332045	Steel	(S)	1.4	(⁵)	(⁶)
336005	Aluminum and aluminum-base alloy	*18.1	8.8	**11.8	6.9
336006	Copper and copper-base alloy	(S)	2.2	**1.5	1.4
336008	Other nonferrous	(D)	(⁵)	(S)	⁶ 4.8
	Fractional horsepower electric motors and generators (less than 1 hp):				
362110	Timing motors, synchronous and subsynchronous	5 603.2	10.6	(D)	(⁷)
362115	All other fractional horsepower electric motors and generators, excluding timing motors	(D)	(⁵)	(S)	⁷ 5.9
	Bearings, including mounted and unmounted:				
356218	Ball	(X)	.2	(X)	-
356201	Roller			(X)	-
367004	Resistors, capacitors, transformers, electron tubes, semiconductors, and other electronic-type components	(X)	77.7	(X)	36.7
344401	Sheet metal products, except stampings	(X)	6.5	(X)	3.2
345001	Bolts, nuts, screws, washers, rivets, and screw machine products	(X)	25.4	(X)	20.1
364300	Current-carrying wiring devices	(X)	6.4	(X)	5.4
282104	Plastics resins consumed in the form of granules, pellets, powders, liquids, etc., excluding sheets, rods, tubes, and shapes	(S)	12.2	(NA)	5.1
349012	Fabricated wire products	(X)	2.3	(X)	5.4
308006	Fabricated plastics products, except gaskets	(X)	14.8	(X)	10.9
320101	Glass and glass products, excluding windows and mirrors	(X)	.9	(X)	.3
346901	Metal stampings	(X)	27.7	(X)	21.5
382501	Electrical instrument mechanisms and meter movements, including instrument relays	(X)	5.1	(X)	8.0
382591	Electrical measuring instruments and parts, n.e.c.	(X)	2.2	(X)	.7
360101	Electric transmission, distribution, and control equipment	(X)	2.8	(X)	5.2
357001	Electronic computing equipment and parts	(X)	12.4	(X)	7.8

See footnotes at end of table.

Table 3. Materials Consumed by Kind: 1987 and 1982—Con.

[Includes quantity and cost of materials consumed or put into production by establishments classified only in this industry. For further explanation, see Cost of Materials in appendix. For meaning of abbreviations and symbols, see introductory text]

1987 material code	Material	1987		1982	
		Quantity ¹	Delivered cost (million dollars)	Quantity ¹	Delivered cost (million dollars)
	INDUSTRY 3822, ENVIRONMENTAL CONTROLS —Con.				
260003	Paper and paperboard products (except paperboard boxes, containers, and corrugated paperboard) ----- 1,000 s tons..	(S)	1.5	(S)	.5
265001	Paperboard containers, boxes, and corrugated paperboard ----- do..	(S)	7.0	(S)	4.3
970099	All other materials and components, parts, containers, and supplies -----	(X)	⁵ 239.7	(X)	189.6
971000	Materials, parts, containers, and supplies, n.s.k. ² -----	(X)	148.8	(X)	56.7
	INDUSTRY 3823, PROCESS CONTROL INSTRUMENTS				
	Materials, parts, containers, and supplies -----	(X)	1 350.3	(X)	1 026.0
	Mill shapes and forms, except castings and forgings:				
	Carbon steel:				
331011	Bars and bar shapes ----- 1,000 s tons..	(S)	3.9	(S)	4.1
331012	Sheet and strip ----- do..	(S)	2.3	**7.2	4.0
331013	Plates ----- do..	(S)	.5	(S)	.8
331015	Structural shapes ----- do..	(S)	4.0	*.9	.5
331017	Wire and wire products ----- do..	(S)	.6	(S)	2.7
331019	All other carbon steel mill shapes and forms ----- do..	**5.3	3.4	(S)	2.5
	Alloy steel, except stainless:				
331021	Bars and bar shapes ----- 1,000 s tons..	(S)	2.5	(S)	2.8
331029	All other alloy steel mill shapes and forms ----- do..	(S)	5.7	(S)	3.2
	Stainless steel:				
331033	Sheet and strip ----- 1,000 s tons..	(S)	4.7	(S)	3.3
331050	All other stainless steel mill shapes and forms ----- do..	(S)	29.3	(S)	17.7
	Copper and copper-base alloy:				
335728	Bare wire for electrical conduction only ----- mil lb..	(S)	2.9		
335102	Rod, bar, and mechanical wire, including extruded and/or drawn shapes ----- do..	(S)	3.9	(S)	6.7
335143	Plate, sheet, and strip, including military cups and discs ----- do..	(S)	.4	(S)	1.1
335152	Pipe and tube ----- do..	(S)	3.9	(S)	3.1
	Aluminum and aluminum-base alloy:				
335301	Sheet, plate, and foil ----- mil lb..	(S)	2.2	(S)	1.3
335405	Extruded shapes, including extruded rod, bar, pipe, tube, etc. ----- do..	(S)	6.3	(S)	3.8
335008	All other aluminum mill shapes and forms (wire, rolled rod and bar, powder, welded tubing, etc.) ----- do..	(S)	7.3	(S)	.8
335792	Insulated copper wire and cable, except magnet wire (quantity of copper content) ----- do..	1.9	3.2	(S)	3.9
	Castings (rough and semifinished):				
332011	Iron (gray and malleable) ----- 1,000 s tons..	**4.8	7.4	(S)	7.2
332045	Steel ----- do..	(S)	11.6	**6.2	15.9
336005	Aluminum and aluminum-base alloy ----- mil lb..	(S)	15.7	(S)	16.3
336006	Copper and copper-base alloy ----- do..	(S)	1.9	*4.9	5.5
336008	Other nonferrous ----- do..	(S)	1.6	**1.5	2.3
	Fractional horsepower electric motors and generators (less than 1 hp):				
362110	Timing motors, synchronous and subsynchronous ----- millions..	(S)	3.6	(S)	5.2
362115	Other fractional horsepower electric motors, excluding timing motors ----- do..	(S)	2.3	(S)	4.8
	Bearings, including mounted and unmounted:				
356218	Ball -----			(X)	2.2
356201	Roller -----	(X)	1.9	(X)	2.0
367004	Resistors, capacitors, transformers, electron tubes, semiconductors, and other electronic-type components -----	(X)	159.2	(X)	104.5
344401	Sheet metal products, except stampings -----	(X)	39.6	(X)	21.0
345001	Bolts, nuts, screws, washers, rivets, and screw machine products -----	(X)	17.8	(X)	17.4
364300	Current-carrying wiring devices -----	(X)	8.7	(X)	11.7
282104	Plastics resins consumed in the form of granules, pellets, powders, liquids, etc., excluding sheets, rods, tubes, and shapes ----- mil lb..	(D)	(³)	(NA)	2.8
349012	Fabricated wire products -----	(X)	10.6	(X)	2.9
308006	Fabricated plastics products, except gaskets -----	(X)	17.7	(X)	7.8
320101	Glass and glass products, excluding windows and mirrors -----	(X)	4.3	(X)	6.9
346901	Metal stampings -----	(X)	14.2	(X)	12.8
382501	Electrical instrument mechanisms and meter movements, including instrument relays -----	(X)	20.2	(X)	22.3
382591	Electrical measuring instruments and parts, n.e.c. -----	(X)	50.7	(X)	40.5
360101	Electric transmission, distribution, and control equipment -----	(X)	6.4	(X)	8.2
357001	Electronic computing equipment and parts -----	(X)	45.5	(X)	21.1
260003	Paper and paperboard products (except paperboard boxes, containers, and corrugated paperboard) ----- 1,000 s tons..	(S)	6.5	(S)	5.1
265001	Paperboard containers, boxes, and corrugated paperboard ----- do..	(S)	16.7	(S)	15.1
970099	All other materials and components, parts, containers, and supplies -----	(X)	⁵ 191.2	(X)	259.8
971000	Materials, parts, containers, and supplies, n.s.k. ² -----	(X)	608.0	(X)	342.4

See footnotes at end of table.

Table 3. Materials Consumed by Kind: 1987 and 1982—Con.

[Includes quantity and cost of materials consumed or put into production by establishments classified only in this industry. For further explanation, see Cost of Materials in appendix. For meaning of abbreviations and symbols, see introductory text]

1987 material code	Material	1987		1982	
		Quantity ¹	Delivered cost (million dollars)	Quantity ¹	Delivered cost (million dollars)
INDUSTRY 3824, FLUID METERS AND COUNTING DEVICES					
	Materials, parts, containers, and supplies -----	(X)	360.6	(X)	247.1
	Mill shapes and forms, except castings and forgings:				
	Carbon steel:				
331011	Bars and bar shapes ----- 1,000 s tons--	(S)	.9	(S)	1.5
331012	Sheet and strip ----- do--	(S)	1.1	(S)	1.4
331013	Plates ----- do--				
331015	Structural shapes ----- do--				
331017	Wire and wire products ----- do--	**1.2	1.0	(S)	.8
331019	All other carbon steel mill shapes and forms ----- do--				
	Alloy steel, except stainless:				
331021	Bars and bar shapes ----- 1,000 s tons--	(S)	.2	(S)	.2
331029	All other alloy steel mill shapes and forms ----- do--	(Z)	(Z)	-	-
	Stainless steel:				
331033	Sheet and strip ----- 1,000 s tons--	(S)	.2	**1	.5
331050	All other stainless steel mill shapes and forms ----- do--	(S)	1.2	(S)	1.0
	Copper and copper-base alloy:				
335728	Bare wire for electrical conduction only ----- mil lb--	(D)	(D)	.1	.2
335102	Rod, bar, and mechanical wire, including extruded and/ or drawn shapes ----- do--	(S)	.3	(S)	4.1
335143	Plate, sheet, and strip, including military cups and discs ----- do--	(S)	.4	(S)	.7
335152	Pipe and tube ----- do--	(D)	(D)	(D)	(⁵)
	Aluminum and aluminum-base alloy:				
335301	Sheet, plate, and foil ----- mil lb--	(S)	.8	*.9	.7
335405	Extruded shapes, including extruded rod, bar, pipe, tube, etc. ----- do--	*.4	1.0	*.3	1.0
335008	All other aluminum mill shapes and forms (wire, rolled rod and bar, powder, welded tubing, etc.) ----- do--	(S)	.1	(S)	.2
335792	Insulated copper wire and cable, except magnet wire (quantity of copper content) ----- do--	(S)	.2	(D)	(⁵)
	Castings (rough and semifinished):				
332011	Iron (gray and malleable) ----- 1,000 s tons--	(S)	8.9	**5.1	8.4
332045	Steel ----- do--	(D)	(D)	(S)	1.3
336005	Aluminum and aluminum-base alloy ----- mil lb--	11.0	27.5	*9.0	20.4
336006	Copper and copper-base alloy ----- do--	(S)	11.5	(S)	12.1
336008	Other nonferrous ----- do--	(D)	(D)	(D)	(⁵)
	Fractional horsepower electric motors and generators (less than 1 hp):				
362110	Timing motors, synchronous and subsynchronous ----- millions--	(Z)	(Z)		
362115	Other fractional horsepower electric motors and generators, excluding timing motors ----- do--	(S)	.1	(S)	1.1
	Bearings, including mounted and unmounted:				
356218	Ball -----				
356201	Roller -----	(X)	1.6	(X)	1.4
367004	Resistors, capacitors, transformers, electron tubes, semiconductors, and other electronic-type components -----	(X)	18.6	(S)	13.6
344401	Sheet metal products, except stampings -----	(X)	1.2	(X)	1.0
345001	Bolts, nuts, screws, washers, rivets, and screw machine products -----				
364300	Current-carrying wiring devices -----	(X)	14.9	(X)	12.5
282104	Plastics resins consumed in the form of granules, pellets, powders, liquids, etc., excluding sheets, rods, tubes, and shapes ----- mil lb--	(X)	(D)	(X)	1.0
		(S)	10.1	(S)	7.5
349012	Fabricated wire products -----	(X)	1.8	(X)	1.3
308006	Fabricated plastics products, except gaskets -----	(X)	11.5	(X)	5.5
320101	Glass and glass products, excluding windows and mirrors -----	(X)	2.8	(X)	1.5
346901	Metal stampings -----	(X)	9.3	(X)	5.8
382501	Electrical instrument mechanisms and meter movements, including instrument relays -----	(X)	10.0	(X)	1.7
382591	Electrical measuring instruments and parts, n.e.c. -----	(X)	12.0		
360101	Electric transmission, distribution, and control equipment -----	(X)	(D)	(X)	2.4
357001	Electronic computing equipment and parts -----	(X)	2.6		
	Paper and paperboard products (except paperboard boxes, containers, and corrugated paperboard) ----- 1,000 s tons--	(D)	(D)	(S)	.1
265001	Paperboard containers, boxes, and corrugated paperboard ----- do--	(S)	3.1	(S)	2.5
970099	All other materials and components, parts, containers, and supplies -----	(X)	94.6	(X)	*90.8
971000	Materials, parts, containers, and supplies, n.s.k. ² -----	(X)	44.5	(X)	42.9
INDUSTRY 3825, INSTRUMENTS TO MEASURE ELECTRICITY					
	Materials, parts, containers, and supplies -----	(X)	2 283.1	(X)	1 576.0
	Mill shapes and forms, except castings and forgings:				
	Carbon steel:				
331011	Bars and bar shapes ----- 1,000 s tons--	(S)	3.0	(S)	1.6
331012	Sheet and strip ----- do--	2.3	3.3	(S)	8.7
331013	Plates ----- do--	(S)	.1	(S)	.5
331015	Structural shapes ----- do--	(S)	(⁹)	(S)	.1
331017	Wire and wire products ----- do--	(D)	(⁹)		
331019	All other carbon steel mill shapes and forms ----- do--	(D)	*2.5	(S)	.9
	Alloy steel, except stainless:				
331021	Bars and bar shapes ----- 1,000 s tons--	(S)	1.3	*1.1	.5
331029	All other steel mill shapes and forms ----- do--	*4.7	5.0	3.2	3.6
	Stainless steel:				
331033	Sheet and strip ----- 1,000 s tons--	**1.1	3.2	**7	1.5
331050	All other stainless steel mill shapes and forms ----- do--	(S)	1.4	(S)	1.8
	Copper and copper-base alloy:				
335728	Bare wire for electrical conduction only ----- mil lb--	(S)	5.3	**5.6	5.2
335102	Rod, bar, and mechanical wire, including extruded and/ or drawn shapes ----- do--	(S)	4.6	*3.7	4.6
335143	Plate, sheet, and strip, including military cups and discs ----- do--			(S)	3.5
335152	Pipe and tube ----- do--	(S)	2.4	(S)	.2

See footnotes at end of table.

Table 3. Materials Consumed by Kind: 1987 and 1982—Con.

[Includes quantity and cost of materials consumed or put into production by establishments classified only in this industry. For further explanation, see Cost of Materials in appendix. For meaning of abbreviations and symbols, see introductory text]

1987 material code	Material	1987		1982	
		Quantity ¹	Delivered cost (million dollars)	Quantity ¹	Delivered cost (million dollars)
	INDUSTRY 3825, INSTRUMENTS TO MEASURE ELECTRICITY—Con.				
	Mill shapes and forms, except castings and forgings—Con.				
	Aluminum and aluminum-base alloy:				
335301	Sheet, plate, and foil ----- mil lb--	(S)	18.8	**6.0	8.0
335405	Extruded shapes, including extruded rod, bar, pipe, tube, etc. ----- do--	(S)	6.8	**2.8	3.5
335008	All other aluminum mill shapes and forms (wire, rolled rod and bar, powder, welded tubing, etc.) ----- do--	(S)	2.5	*8.9	5.1
335792	Insulated copper wire and cable, except magnet wire (quantity of copper content) ----- do--	(S)	4.0	(S)	10.1
	Castings (rough and semifinished):				
332011	Iron (gray and malleable) ----- 1,000 s tons--	(S)	.2	(D)	(D)
332045	Steel ----- do--	(⁵)	(⁵)	(D)	(D)
336005	Aluminum and aluminum-base alloy ----- mil lb--	(S)	8.7	(S)	6.9
336006	Copper and copper-base alloy ----- do--	(D)	(⁵)	(S)	(D)
336008	Other nonferrous ----- do--	(S)	6.3	(S)	.6
	Fractional horsepower electric motors and generators (less than 1 hp):				
362110	Timing motors, synchronous and subsynchronous ----- millions--	(S)	3.9	(S)	4.6
362115	Other fractional horsepower electric motors and generators, excluding timing motors ----- do--	(S)	1.9	(S)	4.4
	Bearings, including mounted and unmounted:				
356218	Ball -----	(X)	1.0	(X)	2.4
356201	Roller -----	(X)	.3	(X)	.4
367004	Resistors, capacitors, transformers, electron tubes, semiconductors, and other electronic-type components -----	(X)	613.2	(X)	370.1
344401	Sheet metal products, except stampings -----	(X)	58.8	(X)	34.9
345001	Bolts, nuts, screws, washers, rivets, and screw machine products -----	(X)	27.7	(X)	22.5
364300	Current-carrying wiring devices -----	(X)	34.6	(X)	21.8
282104	Plastics resins consumed in the form of granules, pellets, powders, liquids, etc., excluding sheets, rods, tubes, and shapes ----- mil lb--	(S)	25.0	(S)	8.0
349012	Fabricated wire products -----	(X)	21.0	(X)	6.1
308006	Fabricated plastics products, except gaskets -----	(X)	23.0	(X)	13.2
320101	Glass and glass products, excluding windows and mirrors -----	(X)	13.5	(X)	12.7
346901	Metal stampings -----	(X)	20.6	(X)	10.8
382501	Electrical instrument mechanisms and meter movements, including instrument relays -----	(X)	73.8	(X)	82.7
382591	Electrical measuring instruments and parts, n.e.c. -----	(X)	111.4	(X)	150.4
360101	Electric transmission, distribution, and control equipment -----	(X)	4.1	(X)	8.3
357001	Electronic computing equipment and parts -----	(X)	61.7	(X)	56.1
260003	Paper and paperboard products, except paperboard boxes, containers, and corrugated paperboard ----- 1,000 s tons--	(S)	21.8	(S)	7.5
265001	Paperboard containers, boxes, and corrugated paperboard ----- do--	(S)	14.1	(S)	11.0
970099	All other materials and components, parts, containers, and supplies -----	(X)	⁵ 390.1	(X)	390.3
971000	Materials, parts, containers, and supplies, n.s.k. ² -----	(X)	682.2	(X)	287.7
	INDUSTRY 3826, ANALYTICAL INSTRUMENTS				
	Materials, parts, containers, and supplies -----	(X)	³¹ 069.2	(X)	(³)
	Mill shapes and forms, except castings and forgings:				
	Carbon steel:				
331011	Bars and bar shapes ----- 1,000 s tons--	(S)	2.1	(NA)	(NA)
331012	Sheet and strip ----- do--	(S)	1.3	(NA)	(NA)
331013	Plates ----- do--	(D)	(⁹)	(NA)	(NA)
331015	Structural shapes ----- do--	(S)	.4	(NA)	(NA)
331017	Wire and wire products ----- do--	(S)	.1	(NA)	(NA)
331019	All other carbon steel mill shapes and forms ----- do--	(D)	9.7	(NA)	(NA)
	Alloy steel, except stainless:				
331021	Bars and bar shapes ----- 1,000 s tons--	(S)	5.3	(NA)	(NA)
331029	All other alloy steel mill shapes and forms ----- do--			(NA)	(NA)
	Stainless steel:				
331033	Sheet and strip ----- 1,000 s tons--	(S)	3.3	(NA)	(NA)
331050	All other stainless steel mill shapes and forms ----- do--	(S)	3.2	(NA)	(NA)
	Copper and copper-base alloy:				
335728	Bare wire (for electrical conduction only) ----- mil lb--			(NA)	(NA)
335102	Rod, bar, and mechanical wire, including extruded and/ or drawn shapes ----- do--	(S)	4.9	(NA)	(NA)
335143	Plate, sheet, and strip, including military cups and discs ----- do--			(NA)	(NA)
335152	Pipe and tube ----- do--			(NA)	(NA)
	Aluminum and aluminum-base alloy:				
335301	Sheet, plate, and foil ----- mil lb--	(S)	3.7	(NA)	(NA)
335405	Extruded shapes, including extruded rod, bar, pipe, tube, etc. ----- do--	(S)	2.2	(NA)	(NA)
335008	All other aluminum mill shapes and forms (wire, rolled rod and bar, powder, welded tubing, etc.) ----- do--	(S)	.4	(NA)	(NA)
335792	Insulated copper wire and cable, except magnet wire (quantity of copper content) ----- do--	(S)	.1	(NA)	(NA)
	Castings (rough and semifinished):				
332011	Iron (gray and malleable) ----- 1,000 s tons--	(D)	(⁵)	(NA)	(NA)
332045	Steel ----- do--	(D)	(⁵)	(NA)	(NA)
336005	Aluminum and aluminum-base alloy ----- mil lb--	4.4	7.1	(NA)	(NA)
336006	Copper and copper-base alloy ----- do--	(D)	(⁵)	(NA)	(NA)
336008	Other nonferrous ----- do--	-	-	(NA)	(NA)
	Fractional horsepower electric motors and generators (less than 1 hp):				
362110	Timing motors, synchronous and subsynchronous ----- millions--	(S)	2.2	(NA)	(NA)
362115	Other fractional horsepower electric motors and generators, excluding timing motors ----- do--	(S)	1.9	(NA)	(NA)

See footnotes at end of table.

Table 3. Materials Consumed by Kind: 1987 and 1982—Con.

[Includes quantity and cost of materials consumed or put into production by establishments classified only in this industry. For further explanation, see Cost of Materials in appendix. For meaning of abbreviations and symbols, see introductory text]

1987 material code	Material	1987		1982	
		Quantity ¹	Delivered cost (million dollars)	Quantity ¹	Delivered cost (million dollars)
	INDUSTRY 3826, ANALYTICAL INSTRUMENTS— Con.				
	Bearings, including mounted and unmounted:				
356218	Ball	(X)	.5	(NA)	(NA)
356201	Roller	(X)	.1	(NA)	(NA)
367004	Resistors, capacitors, transformers, electron tubes, semiconductors, and other electronic-type components	(X)	76.5	(NA)	(NA)
344401	Sheet metal products, except stampings	(X)	23.5	(NA)	(NA)
345001	Bolts, nuts, screws, washers, rivets, and screw machine products	(X)	9.5	(NA)	(NA)
364300	Current-carrying wiring devices	(X)	3.8	(NA)	(NA)
282104	Plastics resins consumed in the form of granules, pellets, powders, liquids, etc., excluding sheets, rods, tubes, and shapes	(S)	1.9	(NA)	(NA)
349012	Fabricated wire products	(X)	2.7	(NA)	(NA)
308006	Fabricated plastics products, except gaskets	(X)	13.0	(NA)	(NA)
320101	Glass and glass products, excluding windows and mirrors	(X)	8.1	(NA)	(NA)
346901	Metal stampings	(X)	4.1	(NA)	(NA)
382501	Electrical instrument mechanisms and meter movements, including instrument relays	(X)	6.7	(NA)	(NA)
382591	Electrical measuring instruments and parts, n.e.c.	(X)	14.2	(NA)	(NA)
360101	Electric transmission, distribution, and control equipment	(X)	.6	(NA)	(NA)
357001	Electronic computing equipment and parts	(X)	18.3	(NA)	(NA)
260003	Paper and paperboard products, except paperboard boxes, containers, and corrugated paperboard	(S)	1.4	(NA)	(NA)
265001	Paperboard containers, boxes, and corrugated paperboard	(S)	3.9	(NA)	(NA)
970099	All other materials and components, parts, containers, and supplies	(X)	256.3	(NA)	(NA)
971000	Materials, parts, containers, and supplies, n.s.k. ²	(X)	585.2	(NA)	(NA)
	INDUSTRY 3827, OPTICAL INSTRUMENTS AND LENSES				
	Materials, parts, containers, and supplies	(X)	³ 655.4	(X)	(²)
	Mill shapes and forms, except castings and forgings:				
	Carbon steel:				
331011	Bars and bar shapes	(S)	1.9	(NA)	(NA)
331012	Sheet and strip			(NA)	(NA)
331013	Plates			(NA)	(NA)
331015	Structural shapes			(NA)	(NA)
331017	Wire and wire products			(NA)	(NA)
331019	All other carbon steel mill shapes and forms			(NA)	(NA)
	Alloy steel, except stainless:				
331021	Bars and bar shapes	(S)	.1	(NA)	(NA)
331029	All other alloy steel mill shapes and forms			(NA)	(NA)
	Stainless steel:				
331033	Sheet and strip	(D)	(D)	(NA)	(NA)
331050	All other stainless steel mill shapes and forms	(D)	(D)	(NA)	(NA)
	Copper and copper-base alloy:				
335728	Bare wire (for electrical conduction only)	(S)	.7	(NA)	(NA)
335102	Rod, bar, and mechanical wire, including extruded and/ or drawn shapes			(NA)	(NA)
335143	Plate, sheet, and strip, including military cups and discs			(NA)	(NA)
335152	Pipe and tube	-	-	(NA)	(NA)
	Aluminum and aluminum-base alloy:				
335301	Sheet, plate, and foil	(S)	.4	(NA)	(NA)
335405	Extruded shapes, including extruded rod, bar, pipe, tube, etc.	(S)	1.3	(NA)	(NA)
335008	All other aluminum mill shapes and forms (wire, rolled rod and bar, powder, welded tubing, etc.)	(S)	1.6	(NA)	(NA)
335792	Insulated copper wire and cable, except magnet wire (quantity of copper content)	-	-	(NA)	(NA)
	Castings (rough and semifinished):				
332011	Iron (gray and malleable)	(S)	.1	(NA)	(NA)
332045	Steel	(S)	.2	(NA)	(NA)
336005	Aluminum and aluminum-base alloy	(S)	5.1	(NA)	(NA)
336006	Copper and copper-base alloy	(S)	.3	(NA)	(NA)
336008	Other nonferrous	(S)	.1	(NA)	(NA)
	Fractional horsepower electric motors and generators (less than 1 hp):				
362110	Timing motors, synchronous and subsynchronous	(D)	(D)	(NA)	(NA)
362115	Other fractional horsepower electric motors and generators, excluding timing motors	(S)	.8	(NA)	(NA)
	Bearings, including mounted and unmounted:				
356218	Ball	(X)	.3	(NA)	(NA)
356201	Roller	(X)	.1	(NA)	(NA)
367004	Resistors, capacitors, transformers, electron tubes, semiconductors, and other electronic-type components	(X)	8.3	(NA)	(NA)
344401	Sheet metal products, except stampings	(X)	2.6	(NA)	(NA)
345001	Bolts, nuts, screws, washers, rivets, and screw machine products	(X)	1.8	(NA)	(NA)
364300	Current-carrying wiring devices	(X)	1.2	(NA)	(NA)
282104	Plastics resins consumed in the form of granules, pellets, powders, liquids, etc., excluding sheets, rods, tubes, and shapes	(D)	(D)	(NA)	(NA)
349012	Fabricated wire products	(X)	.5	(NA)	(NA)
308006	Fabricated plastics products, except gaskets	(X)	2.1	(NA)	(NA)
320101	Glass and glass products, excluding windows and mirrors	(X)	20.4	(NA)	(NA)
346901	Metal stampings	(X)	2.1	(NA)	(NA)
382501	Electrical instrument mechanisms and meter movements, including instrument relays	(X)	(D)	(NA)	(NA)
382591	Electrical measuring instruments and parts, n.e.c.	(X)	.6	(NA)	(NA)
360101	Electric transmission, distribution, and control equipment	(X)	(D)	(NA)	(NA)
357001	Electronic computing equipment and parts	(X)	4.4	(NA)	(NA)

See footnotes at end of table.

Table 3. Materials Consumed by Kind: 1987 and 1982—Con.

[Includes quantity and cost of materials consumed or put into production by establishments classified only in this industry. For further explanation, see Cost of Materials in appendix. For meaning of abbreviations and symbols, see introductory text]

1987 material code	Material	1987		1982	
		Quantity ¹	Delivered cost (million dollars)	Quantity ¹	Delivered cost (million dollars)
	INDUSTRY 3827, OPTICAL INSTRUMENTS AND LENSES—Con.				
260003	Paper and paperboard products, except paperboard boxes, containers, and corrugated paperboard ----- 1,000 s tons..	(S)	.6	(NA)	(NA)
265001	Paperboard containers, boxes, and corrugated paperboard ----- do..	(S)	8.7	(NA)	(NA)
970099	All other materials and components, parts, containers, and supplies -----	(X)	227.5	(NA)	(NA)
971000	Materials, parts, containers, and supplies, n.s.k. ² -----	(X)	251.4	(NA)	(NA)
	INDUSTRY 3829, MEASURING AND CONTROLLING DEVICES, N.E.C.				
	Materials, parts, containers, and supplies -----	(X)	³ 955.0	(X)	(³)
	Mill shapes and forms, except castings and forgings:				
331001	Carbon steel ----- 1,000 s tons..	(S)	31.2	(NA)	(NA)
331020	Alloy steel (except stainless) ----- do..	(S)	6.6	(NA)	(NA)
331031	Stainless steel ----- do..	(S)	13.3	(NA)	(NA)
	Copper and copper-base alloy:				
335728	Bare wire (for electrical conduction only) ----- mil lb..	(S)	2.0	(NA)	(NA)
335102	Rod, bar, and mechanical wire, including extruded and/or drawn shapes ----- do..	*2.7	2.9	(NA)	(NA)
335143	Plate, sheet, and strip, including military cups and discs ----- do..	(S)	3.6	(NA)	(NA)
335152	Pipe and tube ----- do..	(S)	3.6	(NA)	(NA)
	Aluminum and aluminum-base alloy:				
335301	Sheet, plate, and foil ----- mil lb..	(S)	8.3	(NA)	(NA)
335405	Extruded shapes, including extruded rod, bar, pipe, tube, etc. ----- do..	(S)	4.0	(NA)	(NA)
335008	All other aluminum mill shapes and forms (wire, rolled rod and bar, powder, welded tubing, etc.) ----- do..	(S)	2.7	(NA)	(NA)
	Castings (rough and semifinished):				
332012	Iron (gray and malleable) and steel ----- 1,000 s tons..	(S)	15.2	(NA)	(NA)
336005	Aluminum and aluminum-base alloy ----- mil lb..	(S)	8.0	(NA)	(NA)
336003	Other nonferrous ----- do..	(D)	(⁶)	(NA)	(NA)
367004	Resistors, capacitors, transformers, electron tubes, semiconductors, and other electronic-type components -----	(X)	86.6	(NA)	(NA)
265001	Paperboard containers, boxes, and corrugated paperboard ----- 1,000 s tons..	(S)	3.0	(NA)	(NA)
320101	Glass and glass products, excluding windows and mirrors -----	(X)	8.8	(NA)	(NA)
	Bearings, including mounted and unmounted:				
356218	Ball -----	(X)	3.3	(NA)	(NA)
356201	Roller -----	(X)	2.3	(NA)	(NA)
364300	Current-carrying wiring devices -----	(X)	16.2	(NA)	(NA)
382501	Electrical instrument mechanisms and meter movements, including instrument relays -----	(X)	20.2	(NA)	(NA)
282104	Plastics resins consumed in the form of granules, pellets, powders, liquids, etc., excluding sheets, rods, tubes, and shapes ----- mil lb..	(S)	4.4	(NA)	(NA)
344401	Sheet metal products, except stampings -----	(X)	20.7	(NA)	(NA)
345001	Bolts, nuts, screws, washers, rivets, and screw machine products -----	(X)	15.7	(NA)	(NA)
346901	Metal stampings -----	(X)	4.4	(NA)	(NA)
308006	Fabricated plastics products, except gaskets, hose, and belting -----	(X)	6.9	(NA)	(NA)
357004	Electronic computing equipment and parts -----	(X)	34.5	(NA)	(NA)
970099	All other materials and components, parts, containers, and supplies -----	(X)	⁵ 241.4	(NA)	(NA)
971000	Materials, parts, containers, and supplies, n.s.k. ² -----	(X)	388.8	(NA)	(NA)

¹For some establishments, data have been estimated from central unit values which are based on quantity-cost relationships of reported data. The following symbols are used when percentage of each quantity figure estimated in this manner equals or exceeds 10 percent of published figure: * 10 to 19 percent estimated; ** 20 to 29 percent estimated. If 30 percent or more is estimated, figure is replaced by (S).

²Total cost of materials of establishments that did not report detailed materials data, including establishments that were not mailed a form.

³Industry definition is new for 1987; therefore, 1987 data for materials consumed are not comparable to prior-year data. As a result, 1982 materials consumed data are not available.

⁴For 1987, data for material codes 331013 and 331017 have been combined with material code 331019 to avoid disclosing data for individual companies.

⁵Data have been combined with material code 970099 to avoid disclosing data for individual companies.

⁶For 1982, data for material codes 332011 and 332045 were combined with material code 336008 to avoid disclosing data for individual companies.

⁷For 1982, data for material codes 362110 and 362115 were combined to avoid disclosing data for individual companies.

⁸For 1987, data for material codes 331015, 331017, and 331019 have been combined to avoid disclosing data for individual companies.

⁹For 1987, data for material codes 331013 and 331019 have been combined to avoid disclosing data for individual companies.

APPENDIX

Scope and Coverage and Explanation of Terms

GENERAL

The 1987 Census of Manufactures is the 32nd census of manufacturing establishments conducted in the United States. For 1987, it was conducted as part of the economic censuses, which included the censuses of mineral industries, construction industries, retail and wholesale trades, service industries, selected transportation activities, and minority-owned and women-owned businesses, under authority of title 13 of the United States Code. Title 13 specifies that an economic census be conducted every 5 years to cover years ending in 2 and 7.

SCOPE AND COVERAGE

Establishment Basis of Reporting

The census of manufactures is conducted on an establishment basis. All manufacturing establishments with one paid employee or more at any time during the year are covered by the census of manufactures. Therefore, a company operating at more than one location is required to file a separate report for each location. This report excludes information for separately operated administrative offices, warehouses, garages, and other auxiliary units which service manufacturing establishments of the same company. Where these auxiliary operations are conducted at the same location as the manufacturing operation, they are usually included in the report for the operating manufacturing establishment.

Use of Administrative Records

From a universe of approximately 350,000 manufacturing establishments in the 1987 Census of Manufactures, approximately 150,000 small single-establishment companies were excused from filing reports. Selection of the small establishment nonmail cases was done on an industry-by-industry basis. A variable cutoff was used to determine those establishments for which administrative records were to be used in place of a census report. The cutoffs were selected so the administrative-record cases would account for approximately 3 percent or less of the value of shipments for the industry. These cutoffs were then adjusted so that all single-establishment companies with less than 5 employees were excluded from the mail canvass, while all establishments with more than 20 employees were included. Where establishments in the 5 to 20 employee size range were included in the mail canvass, an abbreviated census form was frequently used.

For these nonmail establishments, (and a small number of larger establishment whose reports were not received at the time the data were tabulated) data on employment, payroll, and receipts were obtained from administrative records of other government agencies rather than from census forms. The administrative-record information was then used in conjunction with industry averages to estimate the data for these establishments. The value of shipments and cost of materials were not distributed among specific products and materials but were included in the product and material "not specified by kind" (n.s.k.) categories.

EXPLANATION OF TERMS

Number of establishments and companies—A separate report was required for each manufacturing establishment (plant) with one employee or more. An establishment is defined as a single physical location where manufacturing is performed. A company, on the other hand, is defined as a business organization consisting of one establishment or more under common ownership or control.

All employees—Includes all full-time and part-time employees on the payrolls at any time during the year. Included are all persons on paid sick leave, paid holidays, and paid vacations. Officers of corporations are included as employees; proprietors and partners of unincorporated firms are excluded. The "all employees" number is the average number of production workers plus the number of other employees in mid-March. The number of production workers is the average of those for midmonth payroll periods of March, May, August, and November.

Production workers—Includes workers up through the working-supervisor level engaged in fabricating, processing, assembling, inspecting, receiving, packing, warehousing, shipping (but not delivering), maintenance, repair, janitorial, guard services, product development, auxiliary production for plant's own use (e.g., power-plant), recordkeeping, and other closely associated services. Truckdrivers delivering ready-mixed concrete are also included in production workers.

Other employees—Includes nonproduction personnel, including those engaged in the following activities: supervision above working-supervisor level, sales (including driver/salespersons), sales delivery (truckdrivers and helpers), advertising, credit collection, installation and

servicing of own product, clerical and routine office functions, executive, purchasing, finance, legal, personnel (including cafeteria, etc.), professional, and technical employees.

Payroll—Includes the gross earnings for the “employees” defined above, such as salaries, wages, commissions, dismissal pay, bonuses, vacation and sick leave pay, and compensation in kind, prior to such deductions as employees’ Social Security contributions, withholding taxes, group insurance, union dues, and savings bonds. Respondents were told that in reporting they could follow the definition of payrolls used for calculating the Federal withholding tax.

Production-worker hours—Covers hours worked or paid for at the plant, including actual overtime hours (not straight-time equivalent hours). It excludes hours paid for vacations, holidays, or sick leave when the employee was not at the plant.

Cost of materials—Refers to direct charges actually paid or payable for items consumed or put into production during the year, including freight charges and other direct charges incurred by the establishment in acquiring these materials. It includes the cost of materials or fuels consumed, regardless of whether they were purchased by the individual establishment from other companies, transferred to it from other establishments of the same company, or withdrawn from inventory during the year.

The important components of this cost item are (a) all raw materials, semifinished goods, parts, containers, scrap, and supplies put into production or used as operating supplies and for repair and maintenance during the year; (b) electric energy purchased; (c) fuels consumed for heat, power, or generating electricity; (d) work done by others on materials or parts furnished by manufacturing establishments (contract work); and (e) products bought and resold in the same condition.

Specific materials consumed (table 3)—In addition to the total cost of materials which every establishment was required to report, information was also collected for most manufacturing industries on the consumption of major materials used in manufacturing. These inquiries were restricted to those materials which were important parts of the cost of production in a particular industry and for which cost information was available from manufacturers’ records. Establishments consuming less than a specified amount (usually \$10,000) of a specific material were not requested to report consumption of that material separately. Also, the cost of materials for the small establishments for which administrative records were used was estimated as “not specified by kind” (n.s.k.).

Value of shipments and other receipts—Generally refers to received or receivable net selling values, f.o.b. plant (exclusive of freight and taxes), of all products shipped, both primary and secondary, as well as all

miscellaneous receipts such as receipts for contract work performed for others, installation and repair receipts, sale of scrap, and sale of products bought and resold without further processing. Included are all items made by or for the establishment from materials owned by it whether sold, transferred to other plants of the same company, or shipped on consignment. The net selling value of products made in one plant on a contract basis from materials owned by another was reported by the plant providing the materials.

In a few industries, the value of production or value of work completed is used instead of value of shipments. These industries are identified in the introduction and are footnoted in table 1.

In the case of multiunit companies, the manufacturer was requested to report the value of products transferred to other establishments of the same company at full economic or commercial value, that is, including not only the direct costs of production but also a reasonable proportion of “all other costs” (including company overhead and profit).

Shipments or production of individual products (table 2)—In the 1987 census, detailed shipment information was collected for approximately 11,000 individual products. These products are identified by a seven-digit code and are grouped into approximately 1,500 classes of products, which in turn are primary to 459 four-digit industries. Data at the five-digit product-class level have been collected each year as part of the annual survey of manufactures. Information at the seven-digit level, collected for many industries in the current industrial reports program, is not included in this table.

Value added by manufacture—This measure of manufacturing activity is derived by subtracting the cost of materials, supplies, containers, fuel, purchased electricity, and contract work from the value of shipments for products manufactured plus receipts for services rendered. The result of this calculation is then adjusted by the addition of value added by merchandising operations (that is, the difference between the sales value and cost of merchandise sold without further manufacturing, processing, or assembly) plus the net change in finished goods and work-in-process inventories between the beginning and end of the year.

For those industries where value of production is collected instead of value of shipments (see footnote in table 1), value added is adjusted only for the change in work-in-process inventories between the beginning and end of the year. For those industries where value of work done is collected, the value added does not include an adjustment for the change in finished goods or work-in-process inventories.

Value added avoids the duplication in the figure for value of shipments which results from the use of products of some establishments as materials by others. Value

added is considered to be the best value measure available for comparing the relative economic importance of manufacturing among industries and geographic areas.

Expenditures for new plant and equipment—Establishments in operation and any known plants under construction were asked to report their expenditures for (a) permanent additions and major alterations to manufacturing establishments and (b) new machinery and equipment used for replacement and additions to plant capacity if they are of the type for which depreciation accounts are ordinarily maintained.

These totals exclude expenditures for used plant and equipment, expenditures for land, and cost of maintenance and repairs charged as current operating expenses. Data for used plant and equipment will be published in the final industry bulletin.

End-of-year inventories—Comprised of (a) finished products; (b) work-in-process; and (c) materials, supplies, fuels, etc. Beginning in 1982, respondents were asked to report their inventories at (the lower of) cost or market prior to adjustment to LIFO cost. This is a change from prior years in which respondents were permitted to value their inventories using any generally accepted accounting method.

Therefore, 1982 through 1987 data for inventories are not strictly comparable to prior-year data.

Specialization and coverage ratios—An establishment is classified in a particular industry if its shipments of primary products of the industry exceed in value its shipments of the products of any other single industry. An establishments' shipments include those products assigned to an industry (primary products), those considered primary to other industries (secondary products), and receipts for miscellaneous activities (merchandising, contract work, resales, etc.). The following ratios have been developed to measure the relationship of primary product shipments to the data on shipments for the industry shown in table 1 and data on product shipments shown in table 2.

Specialization ratio—Represents the ratio of primary product shipments to total product shipments (primary and secondary, excluding miscellaneous receipts) for the establishments classified in the industry.

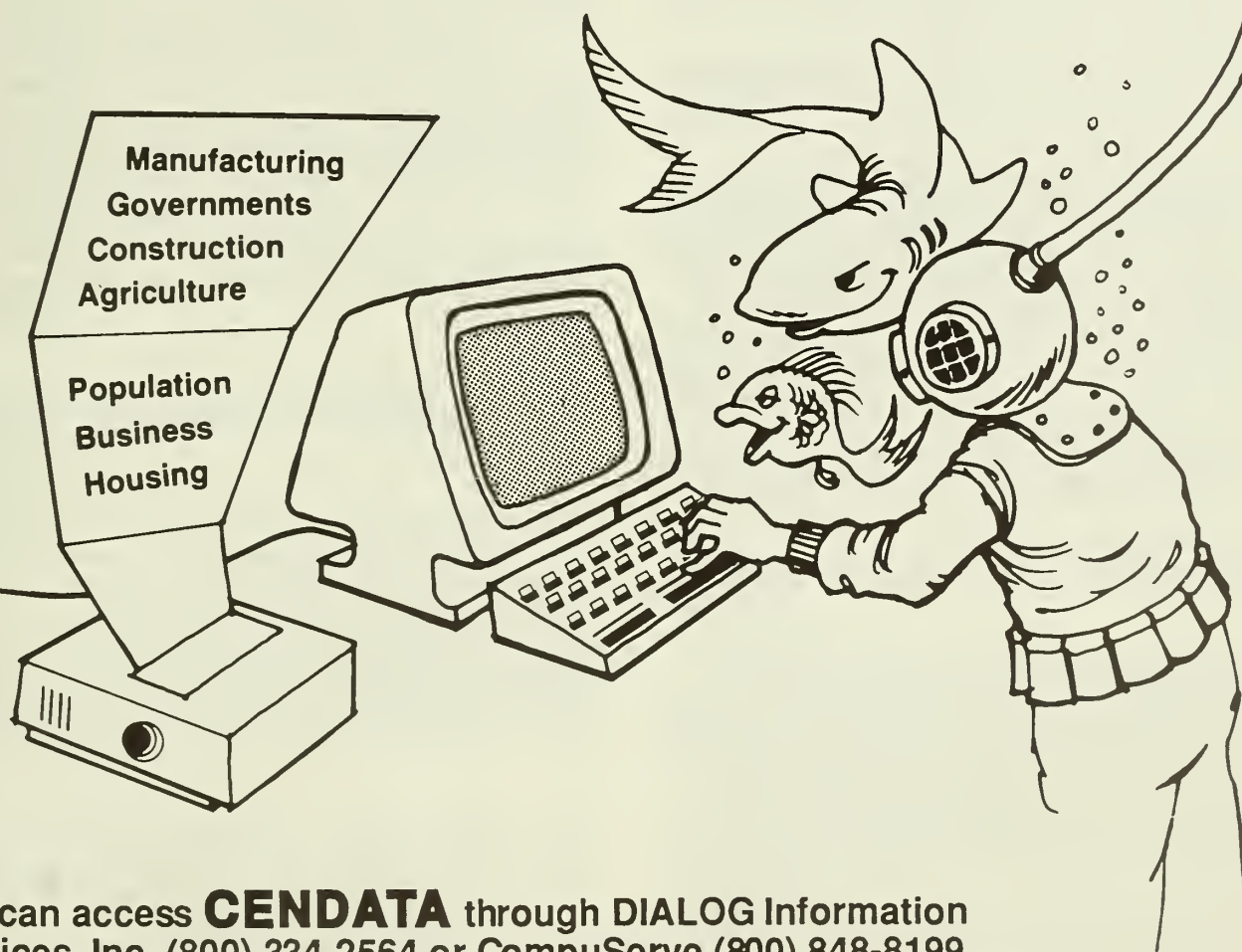
Coverage ratio—Represents the ratio of primary products shipped by the establishments classified in the industry to the total shipments of such products that are shipped by all manufacturing establishments, wherever classified.

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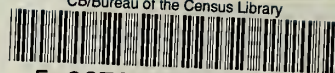
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